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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,275	11/16/2001	Hang Shun Lee	CR1060AC	6356

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EXAMINER

VO, HUYEN X

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,275

Applicant(s)

LEE, HANG SHUN

Examiner

Huyen Vo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/16/01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless – (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2 and 5-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Bahl et al. (US Patent No. 6058205).

3. Regarding claim 1, Bahl et al. disclose a method for creating at least one decision tree for processing a sampled signal indicative of speech, the method comprising the steps of:

providing model sub vectors from partitioned statistical speech models of phones, the models comprising vectors of mean values and associated variance values (*col. 4, ln. 14-24, speech models represented by HMM that inherently includes mean values and variance values*);

statistically analyzing at least some of the model sub vectors of mean values to provide projection vectors indicating directions of relative maximum variance between the sub vectors (*col. 4, ln. 44 to col. 5, ln. 30*);

calculating projection values for a plurality of the projection vectors (*col. 4, ln. 44 to col. 5, ln. 30 or referring to table III*);

selecting potential threshold values from analysis of a range of the projection values (*col. 5, ln. 32 to col. 6, ln. 24*); and

creating the decision tree having decisions to divide the model sub vectors into groups, the groups being leaves of the tree, wherein the decisions are based upon selected threshold values selected from the potential threshold values, the selected threshold values being selected by change in variance between said model sub vectors the variance being determined from said mean values and associated variance values (*col. 5, ln. 32 to col. 6, ln. 56*).

4. Regarding claims 2 and 5-11, Bahl et al. further disclose a method for creating at least one decision tree as claimed in claim 1, wherein the groups have statistical characteristics defining an acoustical subspace (*col. 3, ln. 65 to col. 4, ln. 2*), wherein the potential threshold values are selected from a subset of the projection values (*col. 5, ln. 55 to col. 6, ln. 6-16*), wherein the decisions are based upon an inequality calculation (*col. 8, ln. 25-44*), wherein the inequality calculation relates to inequality between a transpose of a selected model sub vector multiplied by a projection vector and one of said potential threshold values (*col. 4, ln. 63-67 and col. 6, ln. 17-49*), wherein the subset is suitably selected from projection vectors having a projection values with greatest variance (*col. 4, ln. 59-67*), wherein the potential threshold values are determined from a range between a minimum and maximum projection values of each of the projection vectors in the subset (*col. 5, ln. 55-67*), wherein the potential threshold

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values are determined by dividing the range into evenly spaced sub ranges (*col. 5, ln. 55-67*), and wherein, the decision tree is a binary decision tree (*col. 3, ln. 52-67*).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bahl et al. (US Patent No. 6058205) in view of Bishop (US Patent No. 6671661).

7. Regarding claims 3-4, Bahl et al. fail to disclose a method for creating at least one decision tree as claimed in claim 1, wherein the speech models are based on Gaussian probability distributions, and wherein the step of statistically analyzing is further characterized by the projection vectors being calculated by principal component analysis. However, Bishop teach that the speech models are based on Gaussian probability distributions (*col. 5, ln. 53 to col. 6, ln. 5*), and wherein the step of statistically analyzing is further characterized by the projection vectors being calculated by principal component analysis (*col. 6, ln. 6-50*).

Since Bahl et al. and Bishop are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the

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time of invention to modify Bahl et al. by incorporating the teaching of Bishop in order to optimize computational complexity.

8. Claims 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farrell et al. (US Patent No. 5657424) in view of Bahl et al. (US Patent No. 6058205).

9. Regarding claim 12, Farrell et al. disclose a method for speech recognition comprising the steps of:

providing a sampled speech signal processed into at least one feature vector representing spectral characteristics of a speech signal (*element 30 in figure 6*);

dividing the feature vector into sub feature vectors (*element 30 in figure 6 or referring to col. 9, ln. 30-40*);

applying each of the sub feature vectors to a corresponding decision tree, to obtain groups of model sub vectors that are likely to indicate at least one phone of the sampled speech signal (*element 50 in figure 6 or referring to col. 9, ln. 30-67*), the decision tree being created by analysis of the model sub vectors obtained from statistical speech models (*element 50 in figure 6 or referring to col. 9, ln. 30-67*);

selecting a plurality of the model sub vectors from the groups of sub feature vectors to thereby identify a shortlist of model sub vectors (*element 50 in figure 6 or referring to col. 9, ln. 30-67*); and

processing the shortlist to provide a transcription of the sampled speech signal (*element 50 in figure 6 or referring to col. 9, ln. 30-67*).

Farrell et al. fail to specifically disclose that the decision tree has decisions based upon selected threshold values selected from potential threshold values, the selected threshold values being selected by change in variance between said model sub vectors the variance being determined from said mean values and variance values associated with said model sub vectors.

However, Bahl et al. teach that the decision tree has decisions based upon selected threshold values selected from potential threshold values, the selected threshold values being selected by change in variance between said model sub vectors the variance being determined from said mean values and variance values associated with said model sub vectors (*col. 4, ln. 14 to col. 6, ln. 56*).

Since Farrell et al. and Bahl et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Farrell et al. by incorporating the teaching of Bahl et al. in order to minimize the amount of computational complexities.

10. Regarding claims 13-15, Farrell et al. further disclose that the output is "a *suitable output representative of the recognized word*" (*col. 9, ln. 61-62*), but fail to specifically disclose that the output is a text version of the sampled speech signal, wherein the transcription is a control signal, and wherein the control signal activates a function on an electronic device. However, it would have been obvious to one of ordinary skill in the art at the time of invention to realize that computer codes

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representing the recognized word can be used to control the operation of another device.

11. Regarding claim 16, Farrell et al. fail to specifically disclose that the potential threshold values are selected from a subset of projection values obtained from the model sub vectors. However, Bahl et al. further teach that the potential threshold values are selected from a subset of projection values obtained from the model sub vectors (*col. 5, ln. 32-67*).

Since Farrell et al. and Bahl et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Farrell et al. by incorporating the teaching of Bahl et al. in order to minimize the amount of computational complexities

12. Regarding claims 17-18, Farrell et al. further disclose a method for speech recognition of claim 16, wherein the decisions are based upon an inequality calculation (*equation 1 in col. 7*), and wherein the inequality calculation relates to inequality between a transpose of a selected model sub vector multiplied by an associated projection vector and one of said potential threshold values (*col. 7, ln. 27-67*).

13. Regarding claims 19-21, Farrell et al. fail to specifically disclose that the subset is suitably selected from projection vectors having projection values with greatest variance, wherein the potential threshold values are determined from a range between a

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minimum and maximum projection values of each of the projection vectors in the subset, and wherein the potential threshold values are determined by dividing the range into evenly spaced sub ranges.

However, Bahl et al. further teach that the subset is suitably selected from projection vectors having a projection values with greatest variance (*col. 4, ln. 59-67*), wherein the potential threshold values are determined from a range between a minimum and maximum projection values of each of the projection vectors in the subset (*col. 5, ln. 55-67*), wherein the potential threshold values are determined by dividing the range into evenly spaced sub ranges (*col. 5, ln. 55-67*), and wherein, the decision tree is a binary decision tree (*col. 3, ln. 52-67*).

Since Farrell et al. and Bahl et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Farrell et al. by incorporating the teaching of Bahl et al. in order to minimize the amount of computational complexities.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Padmanabhan et al. (IEEE Publication) teach a decision-tree based feature-space quantization for fast gaussian computation that is considered pertinent to the claimed invention.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen Vo whose telephone number is 703-305-8665.


The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner Huyen X. Vo

November 16, 2004



DAVID OMETZ
PRIMARY EXAMINER
ART UNIT 2653